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ABSTRACT

The current study is concerned with identifying racial-ethnic differences in cognitive strategies or structures that are related to performance on verbal ability tests. The study had two goals: (1) to compare the semantic equivalency of intelligence test items between racial-ethnic groups, and (2) to examine the relationships of individual differences in interpreting semantic concepts in test items to solving the items. The results indicated that the test items were not semantically equivalent between groups, and that racial-ethnic differences in solving intelligence test items may be partly based on differences in interpreting relationships. (Author)

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The Semantic Equivalence of Intelligence Test Items Between Ethnic Groups

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Racial-ethnic differences in intelligence test scores have been well documented in the measurement literature. Most minority and lower socio-economic status groups score lower, on the average, than middle-class white groups(Dreger & Miller, 1968; Tyler, 1965). However, many educators are becoming concerned that general intelligence test scores may misrepresent the cognitive capabilities of these groups, especially if the tests are predominanatly verbal. Baratz (1974, p. 126), for instance, reviewed several sources of evidence and concluded that "...the psychologists faulty knowledge about language as well as his methodological inadequancies are largely responsible for the widespread misconception that black (and white) lower class children are verbally defective.". Similarly, Williams (1974) expressed considerable doubt that the intelligence of black children could be measured by tests developed on white children.

Although racial-ethnic differences in intelligence test scores have not been mirrored by an underprediction of minority persons achievement (Cleary, 1974), the nature of racial-ethnic differences in ability test scores is still an important issue in ability measurement. First, as Hotzman (1971) has noted, one of the most volatile criticisms leveled against intelligence testing is that the tests measure the values of the dominant culture, rather than intellectual capacity or potential. Under this viewpoint, the prediction of low achievement for minority race members derives from self-fulfilling prophesies, in that the dominant culture creates artificial barriers which make the culturally different unlikely to succeed. This criticism has not been sufficiently answered by test developers. Second, many educators believe that the effects of racial-ethnic backgrounds on ability and achievement may be modified by educational interventions. This viewpoint has been the impetus for many early intervention and compensatory education programs. Unfortunately, the methodological deficiences in the various program evaluations has left the basic assumptions about ability and achievement relatively untested. Such work, however, could benefit from more specific information about the effects of culture on ability.

Some recent studies have attempted to explicate the more specific effects of racial-ethnic background on ability test performance. Both Baughman and Dahlstrom (1968) and Lesser, Fifer and Clark (1965) found that ethnicity was associated with differences in patterns of ability, as well as overall level. Blacks, for example, score relatively higher on verbal tests than on either spatial or numerical tests. In contrast, Sitkei and Meyers (1969) found that class and race differences were most pronounced on tests involving standard English rather than memory or figural tests. Roberts (1970) suggested that racial-ethnic differences in ability test scores may be directly related to the appropriateness of the test items to the individuals linguistic background. Roberts found that 20 to 30 percent of the items on four major verbal tests were biased against black dialect speakers.

The current study is concerned with identifying racial-ethnic differences in cognitive strategies or structures which are related to performance on verbal ability tests. Three general types of variables may be related to

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racial-ethnic differences in performance on intelligence test items: 1) the semantic equivalence of the test stimuli, 2) the cultural-specificity of the item content and 3) the cultural-specificity of the most efficient hierarchy of cognitive strategies for solving the test items. The current study has two specific goals: 1) to compare the semantic equivalency of test items between black and white students, and 2) to examine the influence of individual differences in interpreting semantic concepts in the items on solving the items.

The subjects were 42 public high school sophomores in a lower socio-economic area of a large Midwestern city. The racial composition of the school was equally divided between white and minority race (primarily black) students. The subjects were randomly selected from required science classes. Lorge-Thorndike IQ's, DAT scores and grades were available from the school files. The intelligence test items were 27 verbal analogies from an item bank which had been scaled to fit the Rasch logistic model for intelligence tests. These items were especially appropriate for the current study since verbal analogies are the most heavily saturated type of item with the general factor common to ability tests. Additionally, previous research with these items had shown that a semantic feature of the items-the type of relationship expressed in the item-mediated item solving and influenced the nature of the capabilities measured by the test.

The 27 verbal analogies were administered as a multiple choice test according to standard instructions. The subjects were then given a task which required them to interpret a semantic feature of the analogies. The subjects were given 27 cards, each containing a completed analogy for one of the 27 items that were administered in the test. The subjects were instructed to write a description of the analogy relationship that was expressed in each item. The analogy test was scored for both number correct and Rasch ability scores. The semantic task was scored for the types of relationships subjects interpreted as being expressed in the analogies. Two undergraduates independently scored the task with an adaptation of Lippman's (1971) relational classification system, consisting of nominal, relational, functional, perceptual, opposities, dimension, examples, comparative, fiat, similarity and non-semantic categories. Agreement between the raters for type of relationship described by subjects was 80 percent over all items.

As would be expected from previous findings, the results indicated that whites scored significantly higher than blacks on all the ability tests, as well as grades. The two groups also differed significantly in the frequencies with which they interpreted the analogies as different types of relationships. The white subjects perceived relatively more perceptual, comparative and non-semantic relationships in the analogies, while the blacks elaborated on more analogies by examples. Furthermore, individual differences in interpreting relationships was found to significantly correlate with item solving ($R=.78$, $p<.05$), with comparative, non-semantic, similarity and functional relationships accounting for relatively substantial proportions of the variance in item solving. Analogy test scores predicted by interpreting relationships, and the unpredicted residual score, were then computed from the regression equation. The groups differed significantly on predicted analogy test scores ($t=2.69$, $p<.01$), but not on the unpredicted residual analogy scores ($t=.30$, $p>.05$).

In addition to mean differences between groups in interpreting relationships, the results indicated that some types of relationships are not correlated with item solving in the same way for blacks and whites. Frequencies of interpreting each type of relationship were regressed on item solving within each group, and the slopes were compared. It was found that the regressions of interpreting analogies as relational or functional on item solving were significant only for whites, while perceptual and similarity analogies were significant only for the black group.

The results from the current study suggest that racial-ethnic differences in solving intelligence test items may be based on differences in interpreting relationships. Not only was interpreting relationships different between groups, but racial-ethnic differences occured only on that proportion of solving analogies that was predicted from interpreting relationships. Furthermore, racial-ethnic differences in achievement may also be related to these semantic differences. Only that part of analogy test scores which was predicted from the relationships was correlated signifcantly with grades. These results would seem to suggest that training in interpreting felationships in verbal material could increase both ability and achievement. The results also suggest that the basis of successful item solving varies between racial-ethnic groups. The differing regressions of relationships on item solving indicates that interpreting the various types of relationships are differentially important in the two groups. That is, successful test performance may not depend upon the same linguistic skills. Additional research on the semantic equivalency of test stimuli is clearly needed.

References

Baratz, J.C. Language abilities of black Americans. In Miller, K.S. & Dreger, R.M. Comparative studies of blacks and whites in the United States. New York: Seminar Press, 1973.

Baughman, EE. & Dahlstrom, W.G. Negro and white children: A psychological study in the rural South. New York: Academic Press, 1968.

Dreger, R.M. & Miller, K.S. Comparative psychological studies of Negroes and whites in the United States: 1959-1963. Psychological Bulletin Monograph Supplement, 1968, 70, No. 3.

Holtzman, W.H. The changing world of mental measurement and its social significance. American Psychologist, 1971, 20, 546-553.

Lesser, G.S., Fifer, G. & Clark, D.H. Mental abilities of children from different social-class and cultural groups. Monographs of the Society for Research in Child Development, 1965, 30, Serial no. 102.

Roberts, E. An evaluation of standardized tests as tools for the measurement of language development. Unpublished paper, Language Research Foundation Cambridge, 1970.

Sitkei, E. & Meyers, C. Comparative structure of intellect in middle- and lower-class foun-year-olds of two ethnic groups. Developmental Society, 1969, 1, 592-604.

Tyler, L.E. The psychology of individual differences. New York: Appleton-Century-Crofts, 1965.

Williams, R.L. Black pride, academic relevance and individual achievement. In Tyler, R.W. & Wolf, R.M. Crucial issues in testing. Berkeley: McCrutchan Publishing Co., 1974.